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A CORE HANDLING DEVICE FOR THE
MARS SAMPLE RETURN MISSION

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This paper reports on an ongoing project at the University of Wisconsin, Madison, to design a core handling device for use on Mars. In addition to this design effort, there is currently activity at UW on several other aspects of the Mars rover including the sample return canister, the core drill and the mobility systems.

To provide a context for our design study we have assumed that a Mars Rover/Sample Return Mission would have the following characteristics:

- A year or more in length.
- Visits by the rover to many sites, on the order of 50 or more.
- Many cores being drilled by the rover, on the order of 100 or more. Each core being about a meter long.
- The capability of returning about 5 kg of Mars regolith to Earth.

These characteristics lead us to believe that in order to bring back a variegated set of samples that can address the range of scientific objectives for a MRSR mission to Mars there needs to be considerable analysis done on board the rover. Furthermore, the discrepancy between the amount of sample gathered and the amount to be returned suggests that there needs to be some method of choosing the optimal set of samples.

This type of analysis will require pristine material—unaltered by the drilling process. Since the core drill thermally and mechanically alters the outer diameter (about 10%) of the core sample, this outer area can not be used. The primary function of the core handling device is to extract subsamples from the core and to position these subsamples, and the core itself if needed, with respect to the various analytical instruments that can be used to perform these analyses.